BioPrima OEM500P-44b0

Fingerprint Identification Board

Datasheet

(Ver.1.0)

APRO TECHNOLOGY (BANGKOK) CO., LTD.

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We hope that all the contents and information contained herein will be of assistance to you. Welcome to comments, opinions & suggestions.

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1. Introduction

This device is a hi-speed fingerprint identification module that enables user to integrate it with a lot of other devices.

The OEM500P-44b0 performs fingerprint authentication according to command of the Host side concerned.

In accordance with customer's demand, it is available to control the value of security (pass) rate applicable to any system, read/write fingerprint minutiae, 1:N or 1:1 match and so on, and thus it is most convenient for customers.

1.1. Special Features

- High speed fingerprint match technology
- Optical sensor
- 1:N, 1:1 match
- Read /write fingerprint minutiae data
- Reasonable control of pass rate
- Command reception and process through parallel communication of standard RS-232C

1.2. Identifying the Parts

OEM500P-44b0 consists of three—fingerprint process device, sensor, communication cable and power supply.

Fingerprint process device (OEM500P-44b0 module) includes CPU, Flash memory and SDRAM.

The sensor of OEM500P-44b0 is an optical module of 16mm x 16mm.

Fig. 1 OEM500P-44b0 module

Fig. 2 Optical sensor

1.3. Product package

- Fingerprint identification module
- Optical sensor
- RS232 cable
- AC ADAPTER(DC5V/1A)
- User's manual
- Sample program (including Source Code)

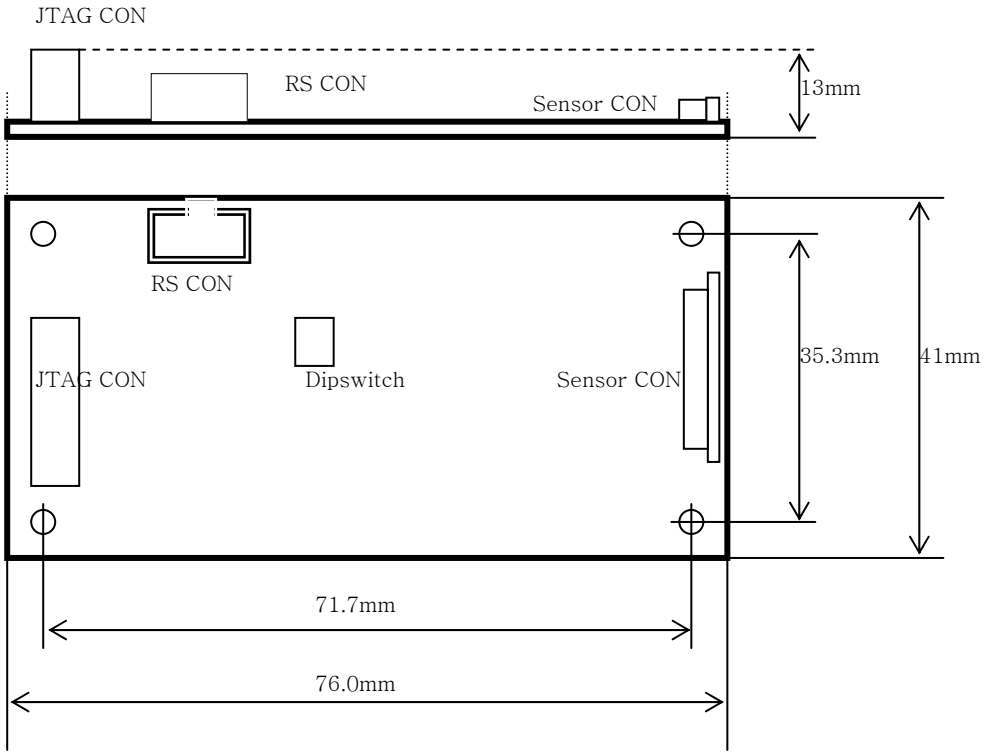
2. Specification

2.1. Technical Specification

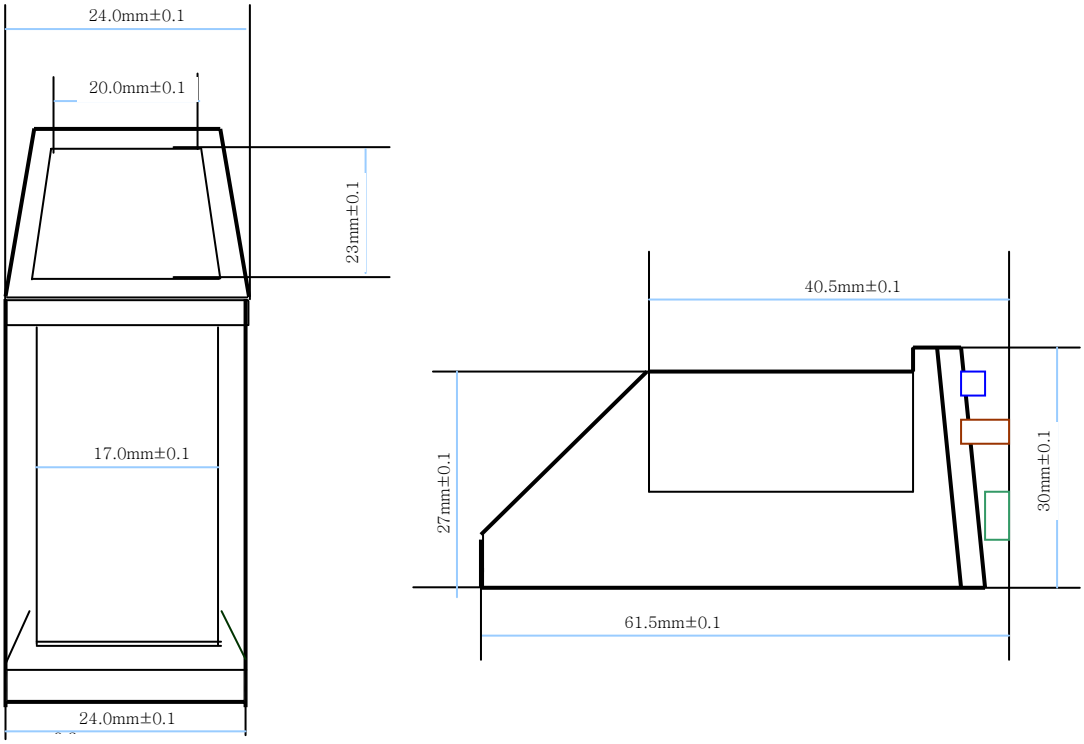
Item		Feature
Mode of combination(I/F)		RS232C (3 line) Baudrate=9600/19200/38400bps Parity=NONE StopBit=1 FlowControl=NONE
Size of fingerprint enroll data		1024 Byte
Number of standard fingerprint enroll data		500 fingerprints
Max. enroll data number		1500 fingerprints
Match mode		1 : N / 1 : 1
Enroll mode		Thrice / once
Setting value of pass rate		1 ~ 5
FAR		< 0.0001% (in case pass rate is 3)
FRR		< 0.01% (in case pass rate is 3)
Enroll time		< 3 sec.
Match time (500 prints)		< 1 sec.
Operating voltage		DC 5V
Operating current		200 mA
Operating environment	temperature	0℃ ~ +60℃
	humidity	20% ~ 80%
Environment for storage	temperature	0℃ ~ +70℃
	humidity	10% ~ 80%
Size of board		76 x 41 x 12 mm (W x H x D)

2.2. Hardware Specification

2.2.1. Board



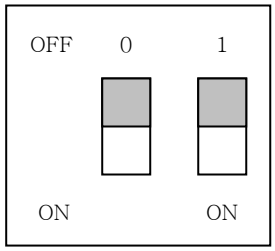
2.2.2. Sensor



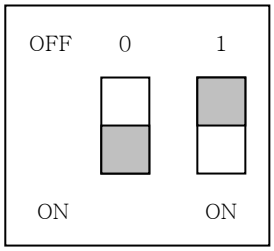
2.2.3. Pin Assignment of RS CON

Name	Pin No.	Function
+5V	1	DC +5V
GND	2	Ground
TXD0	3	Data transmission pin for RS232C
RXD0	4	Data reception pin for RS232C

2.2.4. Dipswitch Usage



Normal Mode



IPL Mode

User should set it to Normal Mode.

3. Data Classification

3.1. Fingerprint Enrollment Data

Fingerprint enrollment data is a binary data with the fixed length of 1,024 bye being generated during fingerprint enrollment.
All the fingerprint enrollment data contain IdentifyNo. and GroupNo. of fingerprint enrollment data.
When enrolling fingerprint, you should be sure to assign IdentifyNo. and GroupNo. of fingerprint enrollment data.
User can read fingerprint enrollment data and save it in Hard Disk or CD.
He/she, also, can re-enroll already saved data.

3.2. Fingerprint Enrollment Data IdentifyNo.

The value of fingerprint enrollment data IdentifyNo. can be from 1 to 2147483647 as a long-type positive integer.
Be sure to set fingerprint enrollment data IdentifyNo. (we call it as ID below.)
ID is made as convenient for management and verification in Host program.
The Host program can include personal IdentifyNo. and other information, so as to make ID.
For example, it can include fingerNo. as follow:

A fingerNo. can be set to any one figure among decimal digits (for example, the lowest figure) and then input personal IdentifyNo. from the next upper figure.
In case that the personal IdentifyNo. is 123456 and fingerNo. is 3, for example, the ID can be made as 1234563 this time.
ID can be a successive number or not.
In addition, one fingerprint enrollment data corresponds to one ID.
The module outputs the matched fingerprint enrollment data ID when the fingerprint enrolled is matched.
The fingerprint enrollment data ID once you enrolled can not be changed.
If you want to change it, you should read, save and then delete the fingerprint enrollment data, before re-enrolling the saved data as a new ID.

3.3. GroupNo.

GroupNo. is used to do a partial search of fingerprint data.
The groupNo. is an integer with the length of 32 bit.
Every groupNo. bit reflects one group's property.
That is, the whole fingerprint enrollment data can be divided into 32 groups.
If a group's bit is 0, it means this does not belong to the group corresponding to it, and if it is 1, it means it belongs to it.
One fingerprint enrollment data can belong to groups of more than one at the same time.
This means one bit of more than one among 32 bits of groupNo. can be 1 at the same time.
The groupNo. 0x00000000 means it does not belong to any group, and the groupNo. 0xFFFFFFFF means it belongs to the whole of group.
Therefore, it means that the groupNo. 0x00000000 can not participate in any match, but the groupNo. 0xFFFFFFFF can do so.
The groupNo. of enrolled fingerprint enrollment data can be separately changed.

3.4. Group Mask

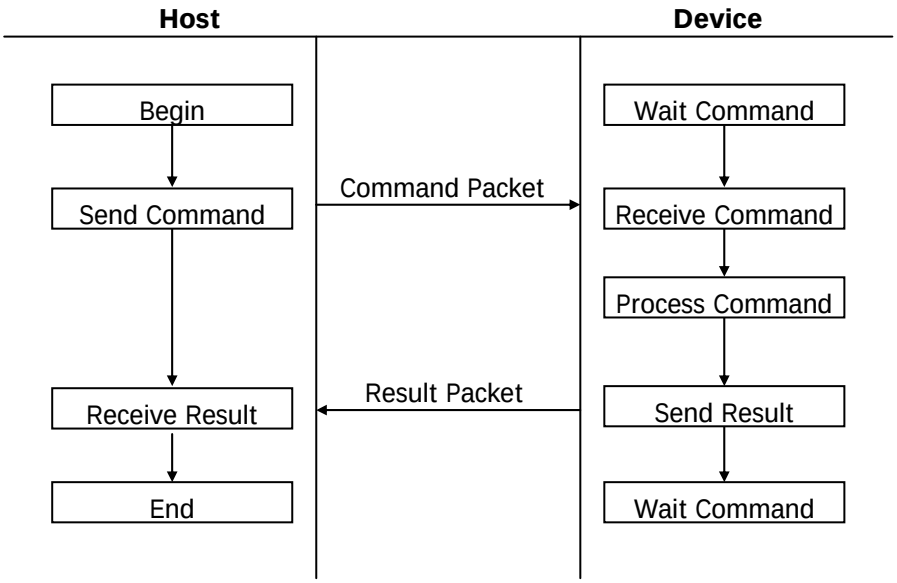
User can select a group of fingerprint enrollment data participating in match as group mask, when using the functions of IdentifyImage or IdentifyFpdata.
Each bit of groupNo. and group mask corresponds to each other.
Each bit of groupNo. defines if the group corresponding to it participates in match or not.
The match is done when the result is 0 after logical-AND of group mask and groupNo. of fingerprint enrollment data.
This means that it can be matched only with the fingerprint data belonging to the group corresponding to the bit which the group mask is not 0.
It means the group mask 0x00000000 does not match with any group, and the group mask 0xFFFFFFFF does so.

3.5. Status of Fingerprint Enrollment Data

All the enrolled fingerprint data contain the status reflecting if the relative fingerprint enrollment data is used to match or not.
If this status is set to Enable, it is used to match, and if it is set to Disable, it is not used.
When enrolling a new fingerprint, the status is on Enable.
The status of enrolled fingerprint data can be separately changed.

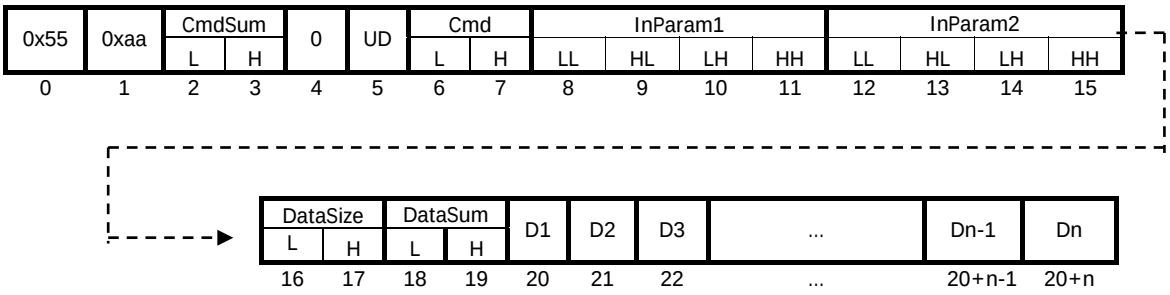
4. Serial Communication Interface

4.1. Communication Protocol



4.2. Communication Packet

4.2.1. Command Packet

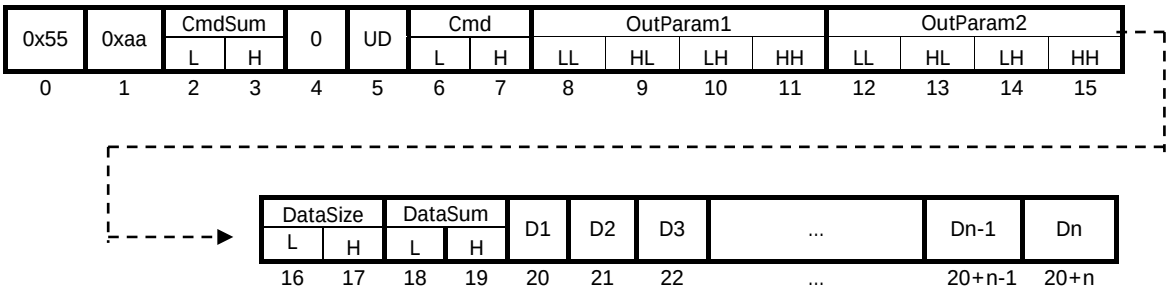


n = DataSize

LL	LOBYTE of LOWORD
HL	HIBYTE of LOWORD
LH	LOBYTE of HIWORD
HH	HIBYTE of HIWORD
L	LOBYTE
H	HIBYTE

OFFSET	ITEM	TYPE	DESCRYPTION
0	0x55	BYTE	Packet Identify code
1	0xaa	BYTE	Packet Identify code
2	CmdSum	WORD	OFFSET[4]+ OFFSET[5] + ... + OFFSET[19]
4	0x00	BYTE	0
5	UD	BYTE	User define field
6	Cmd	WORD	Command Code
8	InParam1	DWORD	Input parameter1
12	InParam2	DWORD	Input parameter2
16	DataSize	WORD	Bytes of block data
18	DataSum	WORD	D1 + D2 + D3 + ... + Dn-1 + Dn

4.2.2. Result Packet



OFFSET	ITEM	TYPE	DESCRYPTION
0	0x55	BYTE	Packet Identify code
1	0xaa	BYTE	Packet Identify code
2	CmdSum	WORD	OFFSET[4]+ OFFSET[5] + ... + OFFSET[19]
4	0x00	BYTE	0
5	UD	BYTE	Echo back UD in Command packet. Device no use
6	Cmd	WORD	Command Code. Echo back from Command packet
8	OutParam1	DWORD	Output parameter1
12	OutParam2	DWORD	Output parameter2
16	DataSize	WORD	Bytes of block data
18	DataSum	WORD	D1 + D2 + D3 + ... + Dn-1 + Dn

5. Serial Communication Command

5.1. Command List

Name	Command Code			Description
	Text	Hex	Dec	
Open	OP	0x504F	20559	Open fingerprint identification module.
Close	CL	0x4C43	19523	Close fingerprint identification module.
SetSecurity	SS	0x5353	21331	Set pass rate.
SetBaudrate	SB	0x4253	16979	Change communication speed.
Connect	CN	0x4E43	20035	Check the connection status of fingerprint identification module.
SendFpdata	FD	0x4446	17478	Transmit fingerprint minutiae data.
CaptureImage	IM	0x4D49	19785	Input fingerprint image.
ProcessImage1	E1	0x3145	12613	Process the first fingerprint image when it is enrolled three times.
ProcessImage2	E2	0x3245	12869	Process the second fingerprint image when it is enrolled three times.
ProcessImage3	E3	0x3345	13125	Process the third fingerprint image when it is enrolled three times.
CreateFpdata123	E4	0x3445	13381	Generate a fingerprint enrollment data when it is enrolled three times.
EnrollSave	ES	0x5345	21317	Register fingerprint enrollment data.
CheckDouble	CD	0x4443	17475	Perform double checking of fingerprint enrollment data.
IdentifyImage	IA	0x4149	16713	Match the input fingerprint with the whole of enrollment data.
VerifyImage	VA	0x4156	16726	Match the input fingerprint with the ID data.
IdentifyFpdata	IF	0x4649	17993	Match the transmitted fingerprint data with the whole of enrollment data.
VerifyFpdata	VF	0x4656	18006	Match the transmitted fingerprint data with the ID enrollment data.
EnrollCount	RC	0x4352	17234	Get the number of enrollment data.
EmptyCount	MC	0x434D	17229	Get the number of fingerprint data possible to enroll.
EnableFpCount	EC	0x4345	17221	Get the number of fingerprint data that the status is on Enable.
ReadStatus	RU	0x5552	21842	Read status.
EnableStatus	EU	0x5545	21829	Set status to Enable.
DisableStatus	DU	0x5544	21828	Set status to Disable.
CheckID	CI	0x4943	18755	Verify if there is a fingerprint enroll No. specified.
ReadFirstID	FI	0x4946	18758	Get the first fingerprint data ID.
ReadNextID	NI	0x494E	18766	Get the next fingerprint data ID.
ReadGroup	RG	0x4752	18258	Read groupNo.
WriteGroup	WG	0x4757	18263	Update groupNo.
ReadFpData	RF	0x4652	18002	Read fingerprint data with ID.
DeleteFpdata	DF	0x4644	17988	Delete fingerprint data.
ClearFpdata	CF	0x4643	17987	Delete all the fingerprint data.
ReadSoftwareID	RS	0x5352	21330	Read SoftwareID.
ReadProductID	RP	0x5052	20562	Read ProductID.
WriteProductID	WP	0x5057	20567	Write ProductID.
TestSensor	TS	0x5354	21332	Check fingerprint sensor.

5.2. Error Code

Error	Value
IMAGE_ERR	-1
FPDATA_ERR	-2
ID_ERR	-3
OVER_ERR	-4
PARAM_ERR	-5
SENSOR_ERR	-6
CMD_ERR	-7
INTER_ERR	-100

As INTER_ERR is the output of error happening by internal factor of device, it is not described about the explanation of individual command below.
However, the possibility of this error's output exists in all the commands.

5.3. Commands

5.3.1. Open

Function	**Open**	
InParam1	0	Not used
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	>=0	- Normal completion. It is the number of fingerprint data participating in match. - That is, it is the number of fingerprint data which the status is on Enable among all the enrollment data.
	SENSOR_ERR	Error in fingerprint image capture device
OutParam2	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	- Open fingerprint identification module. - Initialize point of fingerprint data record. - Initialize fingerprint capture device. - Initialize fingerprint identification engine. - When executing this command, you should not permit direct light from shining the fingerprint capture device. - When executing this command, you should not touch the fingerprint capture device. - In case of touching it, that command may cause SENSOR_ERR return.	

5.3.2. Close

Function	**Close**	
InParam1	0	Not used
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	0	Normal completion
OutParam2	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	Close fingerprint identification module.	

5.3.3. SetSecurity

Function	**SetSecurity**	
InParam1	n	- The value of recognition rate you are about to set. - Able to set one value of integer 1,2,3,4 and 5.
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	> 0	- The setting value before change. - One value of integer 1,2,3,4 and 5.
	PARAM_ERR	It is not a value of input parameter error integer 1,2,3,4 and 5.
OutParam2	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	- Set recognition rate of fingerprint identification engine. - Able to set a value of integer 1,2,3,4 and 5 - The number 1 means the lowest recognition rate and 5 means the highest. - The default is 3. .	

5.3.4. SetBaudrate

Function	**SetBaudrate**	
InParam1	9600 19200 38400	Communication value to set.
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	0	Normal completion
	PARAM_ERR	It is not a value of setting values 9600/19200/38400
OutParam2	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	- Change communication speed. - After completing this command's execution, a new communication speed is used from the next command's reception. - The communication setting value is 9600bps when the power supply is turned on.	

5.3.5. Connect

Function	**Connect**	
InParam1	*****	Any value
InParam2	*****	Any value
DataSize	0	No transmission data
BlockData	0	None
OutParam1	*****	Echo back InParam1
OutParam2	*****	Echo back InParam2
DataSize	0	No reception data
BlockData	0	None
Description	- Check communication connecting status. - As InParam1 and InParam2 is set to Echoback toward OutParam1 and OutParam2, these values is compared to see if they are same.	

5.3.6. SendFpData

Function	**SendFpdata**	
InParam1	0	Not used
InParam2	0	Not used
DataSize	1024	Byte number of fingerprint data
BlockData	1024	Fingerprint data
OutParam1	0	Success in transmission
	FPDATA_ERR	The fingerprint data transmitted is not valid.
OutParam2	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	- One fingerprint data is transmitted to fingerprint identification module through RS232C. - This fingerprint data is used to enroll and match.	

5.3.7. CaptureImage

Function	**CaptureImage**	
InParam1	0	Not used
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	0	The fingerprint image was input from fingerprint capture device.
	IMAGE_ERR	You did not put your finger on the fingerprint capture device.
OutParam2	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	- Check if you have put your finger on the fingerprint capture device or not, after once inputting a fingerprint image. - The fingerprint image data is saved. - This image is used to enroll and match.	

5.3.8. ProcessImage1

Function	**ProcessImage1**	
InParam1	0	Not used
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	0	Normal completion
	IMAGE_ERR	It is a fingerprint image impossible to enroll.
OutParam2	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	- This function must be used if you are about to input a fingerprint as three images. - Process the first fingerprint image obtained from the result of the command execution of **CaptureImage.** - The fingerprint minutiae data obtained is saved in the first buffer of internal memory. - This fingerprint minutiae is used by **CreateFpdata123.**	

5.3.9. ProcessImage2

Function	**ProcessImage2**	
InParam1	0	Not used
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	0	Normal completion
	IMAGE_ERR	It is a fingerprint image impossible to enroll.
OutParam2	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	- This function must be used if you are about to input a fingerprint as three images. - Process the second fingerprint image obtained from the result of the command execution of **CaptureImage.** - The fingerprint minutiae data obtained is saved in the second buffer of internal memory. - This fingerprint minutiae is used by **CreateFpdata123.**	

5.3.10. ProcessImage3

Function	**ProcessImage3**	
InParam1	0	Not used
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	0	Normal completion
	IMAGE_ERR	It is a fingerprint image impossible to enroll.
OutParam2	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	- This function must be used if you are about to input a fingerprint as three images. - Process the third fingerprint image obtained from the result of the command execution of **CaptureImage.** - The fingerprint minutiae data obtained is saved in the third buffer of internal memory. - This fingerprint minutiae is used by **CreateFpdata123.**	

5.3.11. CreateFpdata123

Function	**CreateFpdata123**	
InParam1	0	Not used
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	0	The fingerprint enrollment data was created.
	IMAGE_ERR	The fingerprint enrollment data can not be created.
OutParam2	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	- This function must be used if you are about to input a fingerprint as three images. - The fingerprint enrollment data is created from the three data obtained by the command execution result of **ProcessImage1, ProcessImage2** and **ProcessImage3.** - The fingerprint data obtained is saved in the internal memory.	

5.3.12. CheckDouble

Function	**CheckDouble**	
InParam1	0	Not used
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	> 0	Double fingerprint enrollment data ID
	0	The double fingerprint enrollment data does not exist.
	FPDATA_ERR	The fingerprint data is not valid.
OutParam2	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	- Perform double check of next fingerprint enrollment data. - In other words, it is matched with all the fingerprint data (including fingerprint data that the status is on Disable) enrolled in Flash and check if the same fingerprint has been already enrolled. • Fingerprint enrollment data transmitted by SendFpdata. • Fingerprint enrollment data created by CreateFpdata123.	

5.3.13. EnrollSave

Function	**EnrollSave**	
nParam1	ID	Fingerprint enrollment data ID
InParam2	Group	GroupNo.
DataSize	0	No transmission data
BlockData	0	None
OutParam1	0	Success in enrollment
	ID_ERR	ID <= 0 ID is duplicate.
	OVER_ERR	Error in enrollment database overfull.
	FPDATA_ERR	The fingerprint data is not valid.
OutParam2	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	- The following fingerprint enrollment data is enrolled. (it is saved in Flash memory.) • Fingerprint enrollment data transmitted by SendFpdata. • Fingerprint enrollment data created by CreateFpdata123.	

5.3.14. IdentifyImage

Function	**IdentifyImage**	
InParam1	GroupMask	Mask of groupNo.
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	> 0	Success in match. The fingerprint enrollment data ID matched
	0	Failure in match. There is no fingerprint data to match.
	IMAGE_ERR	Fingerprint image impossible to match.
OutParam2	Group	GroupNo. of the fingerprint enrollment data matched.
DataSize	0	No reception data
BlockData	0	None
Description	- The 1:N match of fingerprint image obtained by the result of command execution of **CaptureImage** is performed. - The fingerprint data that the status is set to Disable, is not matched. - The value of GroupMask and Group is 32 bit with group meaning per bit. - After logical-<AND> of the value of GroupMask and fingerprint enrollment data group of database, it is not matched if the result is 0, and it is done if it is not 0.	

5.3.15. VerifyImage

Function	**VerifyImage**	
InParam1	ID	Fingerprint enrollment data ID to match
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	> 0	Success in match. Fingerprint enrollment data ID matched. It is the same with InParam1.
	0	Failure in match
	ID_ERR	ID <= 0 - There is not fingerprint enrollment data with ID. - The status of fingerprint enrollment data with ID is set to Disable.
	IMAGE_ERR	Fingerprint image impossible to match
OutParam2	Group	GroupNo. of the fingerprint enrollment data matched
DataSize	0	No reception data
BlockData	0	None
Description	- The 1:1 match of fingerprint image obtained by the result of command execution of **CaptureImage** is performed. - The fingerprint data that the status is set to Disable, is not matched.	

5.3.16. IdentifyFpdata

Function	**IdentifyFpdata**	
InParam1	GroupMask	Mask of groupNo.
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	> 0	- Success in match. - Fingerprint enrollment data ID matched.
	0	- Failure in match. - There is not fingerprint enrollment data to match.
	FPDATA_ERR	Fingerprint data impossible to match
OutParam2	Group	GroupNo. of the fingerprint enrollment data matched.
DataSize	0	No reception data
BlockData	0	None
Description	- The 1:N match of fingerprint data obtained by the result of command execution of **SendFpdata** is performed. - It does not match with the fingerprint data that the status is set to Disable. - The value of GroupMask and Group is 32 bit with group meaning per bit. - After logical-<AND> of the value of GroupMask and fingerprint enrollment data group of database, it is not matched if the result is 0, and it is done if it is not 0.	

5.3.17. VerifyFpdata

Function	**VerifyFpdata**	
InParam1	ID	Fingerprint enrollment data ID to match
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	> 0	Success in match. Fingerprint enrollment dat ID matched. It is the same with InParam1.
	0	Failure in match
	ID_ERR	ID <= 0 - There is no fingerprint enrollment data with ID. - The status of fingerprint enrollment data with ID is set to Disable.
	FPDATA_ERR	Fingerprint data impossible to match
OutParam2	Group	GroupNo. of the fingerprint enrollment data matched.
DataSize	0	No reception data
BlockData	0	None
Description	- The 1:1 match of fingerprint image obtained by the result of command execution of **SendFpdata** is performed. - It does not match the fingerprint data that the status is set to Disable.	

5.3.18. EnrollCount

Function	**EnrollCount**	
InParam1	0	Not used
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	nnn	Number of fingerprint data currently enrolled.
OutParam1	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	- Get the number of current enrolled fingerprint data. - Regardless of status, all are counted.	

5.3.19. EmptyCount

Function	**EmptyCount**	
InParam1	0	Not used
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	nnn	Fingerprint data number possible to enroll. (empty record number)
OutParam2	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	- Get the fingerprint data number possible to enroll (empty record number). - All are counted regardless of the status.	

5.3.20. EnableFpCount

Function	**EnableFpCount**	
InParam1	0	Not used
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	nnn	Fingerprint data number which the status is set to Disable.
OutParam2	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	- Get the fingerprint data number of current enrolled data that the status is set to Enable. - All the enrolled fingerprint data contain the status reflecting if the relative fingerprint data is used to match or not. - If this status is set to Enable, it is used to match, and if it is set to Disable, it is not used. - When enrolling a new fingerprint, the status is set to Enable.	

5.3.21. ReadStatus

Function	**ReadStatus**	
InParam1	nnn	Fingerprint data ID
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	1	The status is set to Enable. That is, it is used to match.
	0	The status is set to Disable. That is, it is not used to match.
	ID_ERR	There is not fingerprint data with ID.
OutParam2	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	- Read the status of fingerprint data with ID. - All the enrolled fingerprint data contain the status reflecting if the relative fingerprint data is used to match or not. - If this status is set to Enable, it is used to match, and if it is set to Disable, it is not used. - When enrolling a new fingerprint, the status is set to Enable.	

5.3.22. EnableStatus

Function	**EnableStatus**	
InParam1	nnn	Fingerprint data ID
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	0	Success
	ID_ERR	There is no fingerprint data with.
OutParam2	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	- The status of fingerprint data with ID is set to Enable. - All the enrolled fingerprint data contain the status reflecting if the relative fingerprint data is used to match or not. - If this status is set to Enable, it is used to match, and if it is set to Disable, it is not used. - When enrolling a new fingerprint, the status is set to Enable. It becomes effective soon after this command's execution.	

5.3.23. DisableStatus

Function	**DisableStatus**	
InParam1	nnn	Fingerprint data ID
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	0	Success
	ID_ERR	There is no fingerprint data with ID.
OutParam2	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	- The status of fingerprint data with ID is set to Disable. - All the enrolled fingerprint data contain the status reflecting if the relative fingerprint data is used to match or not. - If this status is set to Enable, it is used to match, and if it is set to Disable, it is not used. - When enrolling a new fingerprint, the status is set to Enable. It becomes effective soon after this command's execution.	

5.3.24. CheckID

Function	**CheckID**	
InParam1	nnn	ID to be searched
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	0	ID exists.
	ID_ERR	There is no fingerprint data with ID.
OutParam2	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	- Verify if there is an ID specified. - The status is disregarded.	

5.3.25. ReadFirstID

Function	**ReadFirstID**	
InParam1	0	Not used
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	> 0	First fingerprint record ID
	0	There is no fingerprint data enrolled.
OutParam2	Group	GroupNo.
DataSize	0	No reception data
BlockData	0	None
Description	- The fingerprint identification module contains a record point directing the current fingerprint data record. - This point is initialized as the first record point so as to get fingerprint data ID. The status is not regarded. - The default value of fingerprint data record point directs the first record.	

5.3.26. ReadNexID

Function	**ReadNextID**	
InParam1	0	Not used
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	> 0	Next fingerprint data record ID
	0	There is no fingerprint data next to the current record.
OutParam2	Group	GroupNo.
DataSize	0	No reception data
BlockData	0	None
Description	- The fingerprint identification module contains a record point directing the current fingerprint data record. - Move this fingerprint data record point into the data record next to the current record, and then get fingerprint data ID. - The status is not regarded. - This command must be sure to be executed after **ReadFirstID** command execution. - The default value of fingerprint data record point directs the first data record. - Able to get all the fingerprint data ID enrolled by repeating this command's execution.	

5.3.27. ReadGroup

Function	**ReadGroup**	
InParam1	nnn	Fingerprint enrollment data ID
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	0xXXXXXXXX	GroupNo. of fingerprint enrollment data with ID.
	ID_ERR	There is no fingerprint data with ID.
OutParam2	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	Read the groupNo. of fingerprint enrollment data with ID.	

5.3.28. WriteGroup

Function	**WriteGroup**	
InParam1	nnn	Fingerprint enrollment data ID
InParam2	0xXXXXXXXX	New groupNo.
DataSize	0	No transmission data
BlockData	0	None
OutParam1	0	The groupNo. was updated.
	ID_ERR	There is no fingerprint data with ID.
OutParam2	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	Updata the groupNo. of fingerprint enrollment data with ID.	

5.3.29. ReadFpdata

Function	**ReadFpdata**	
InParam1	nnn	Fingerprint data ID to read
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	1024	Byte number of fingerprint enrollment data
	ID_ERR	There is no fingerprint data with ID. This time, the data being transmitted is filled with 0.
OutParam2	0	Not used
DataSize	1024	Byte number of transmission data
BlockData	1024	Fingerprint enrollment data
Description	Read fingerprint data with ID.	

5.3.30. DeleteFpdata

Function	**DeleteFpdata**	
InParam1	nnn	Fingerprpint data ID
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	0	Success
	ID_ERR	There is no fingerprint data with ID.
OutParam2	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	- Delete the fingerprint data with ID from enrollment database. - It becomes effective soon after this command's execution.	

5.3.31. ClearFpdata

Function	**ClearFpdata**	
InParam1	0	Not used
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	0	Success
OutParam2	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	- Delete all the fingerprint data from enrollment database. - It becomes effective soon after this command's execution. ㅇ	

5.3.32. ReadSoftwareID

Function	**ReadSoftwareID**	
InParam1	0	Not used
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	0xXXXXXXXX	Software ID
OutParam2	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	- Read software ID. - The software ID verifies software. - The software ID is an unsigned long-type integer.	

5.3.33. WriteProductID

Function	**WriteProductID**	
InParam1	0xXXXXXXXX	Product ID you are about to write
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	0	Success
OutParam2	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	- Change product ID. - The second product manufacturer can write product ID in Flash memory and verify it by using this. - Product ID is not deleted when the power supply is turned off. - Product ID is an unsigned long-type integer. - The default value of product ID is a hexadecimal digit of 0xFFFFFFFF.	

5.3.34. ReadProductID

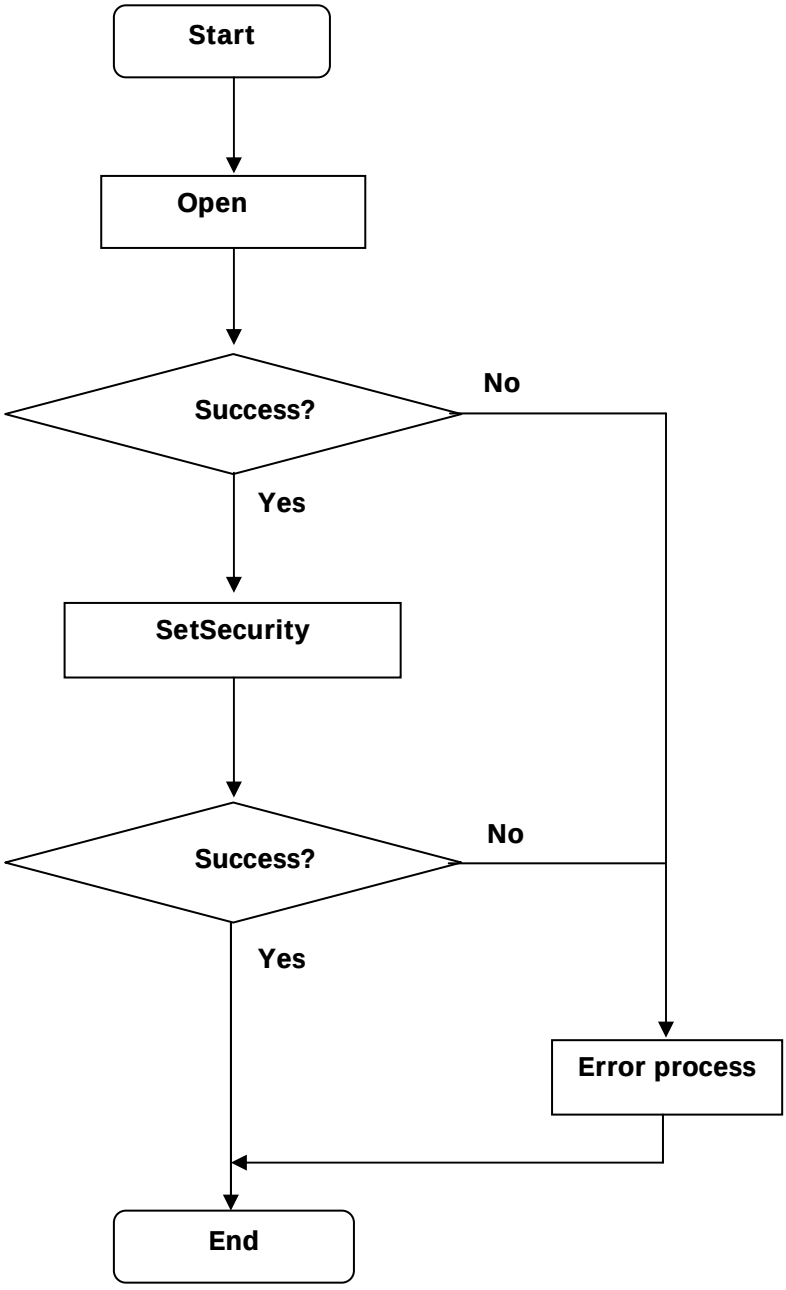
Function	**ReadProductID**	
InParam1	0	Not used
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	0xXXXXXXXX	Product ID
OutParam2	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	- Read product ID. - The second product manufacturer can write product ID in Flash memory and verify it by using this. - Product ID is not deleted when the power supply is turned off. - Product ID is an unsigned long-type integer. - The default value of product ID is a hexadecimal digit of 0xFFFFFFFF.	

5.3.35. TestSENSOR

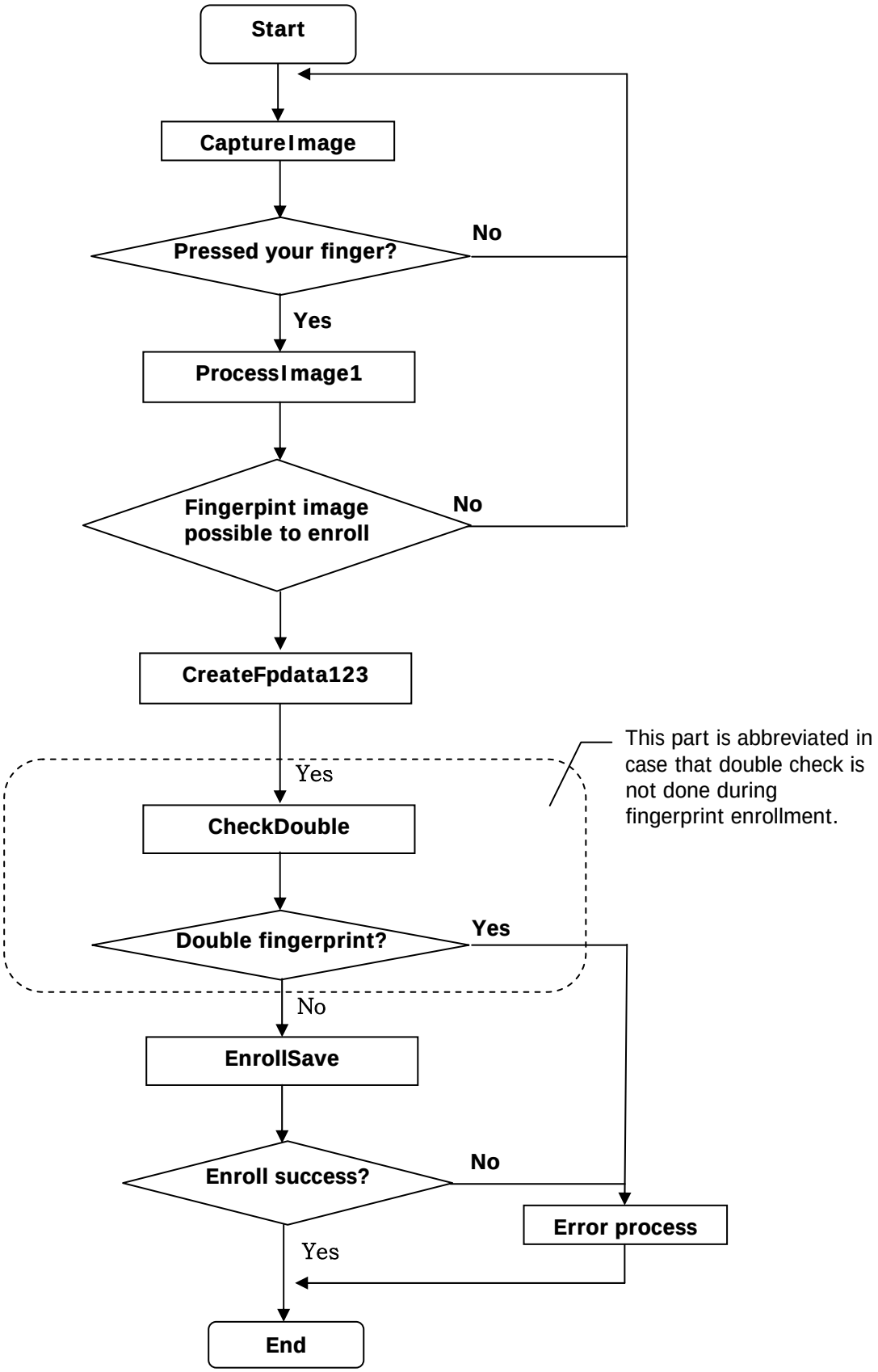
Function	**TestSensor**	
InParam1	0	Not used
InParam2	0	Not used
DataSize	0	No transmission data
BlockData	0	None
OutParam1	0	Normal
	SENSOR_ERR	Error
OutParam2	0	Not used
DataSize	0	No reception data
BlockData	0	None
Description	- Perform device checking of fingerprint capture device. - When performing this command, you should not touch your finger on the fingerprint capture device. - In case of touching it, this command may cause an error.	

5.4. How To Use Command

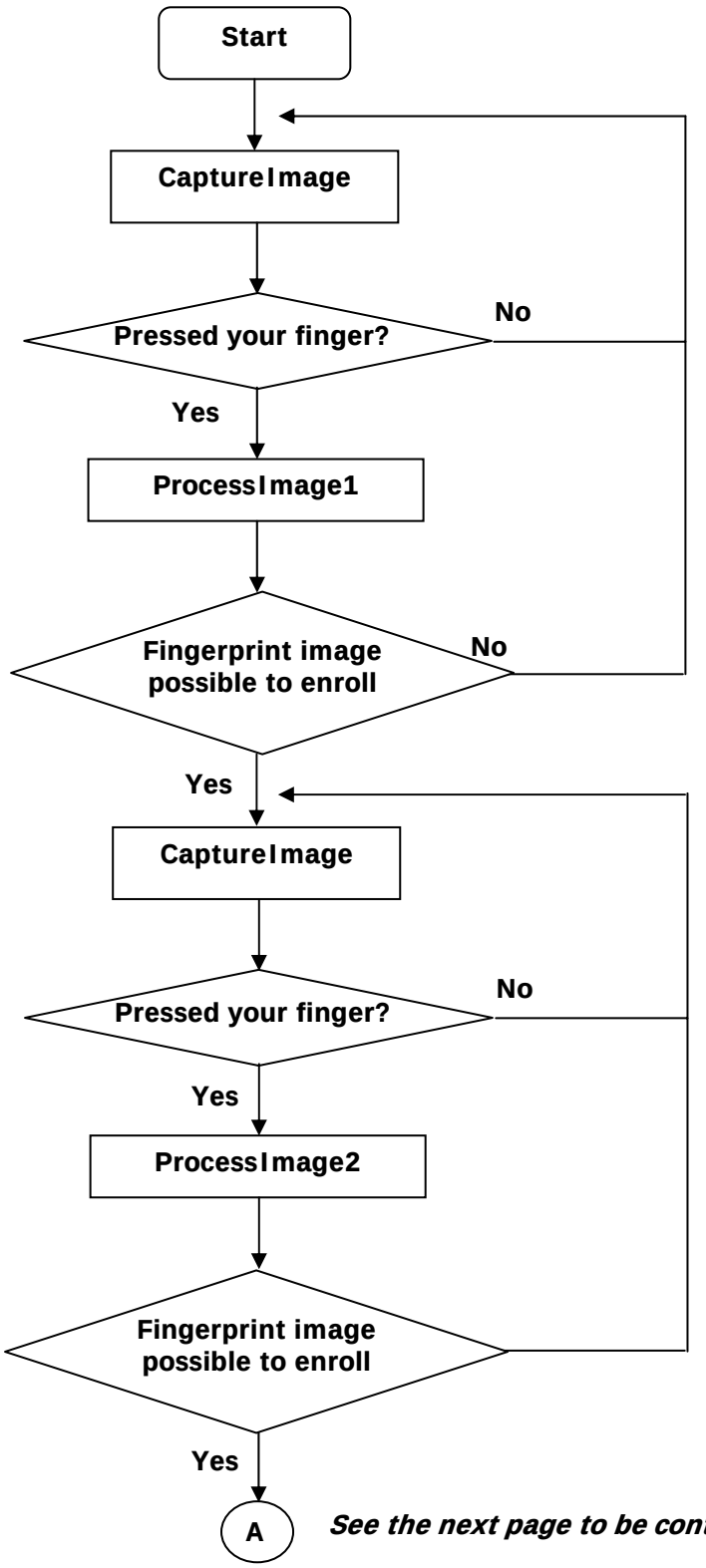
5.4.1. Initialization



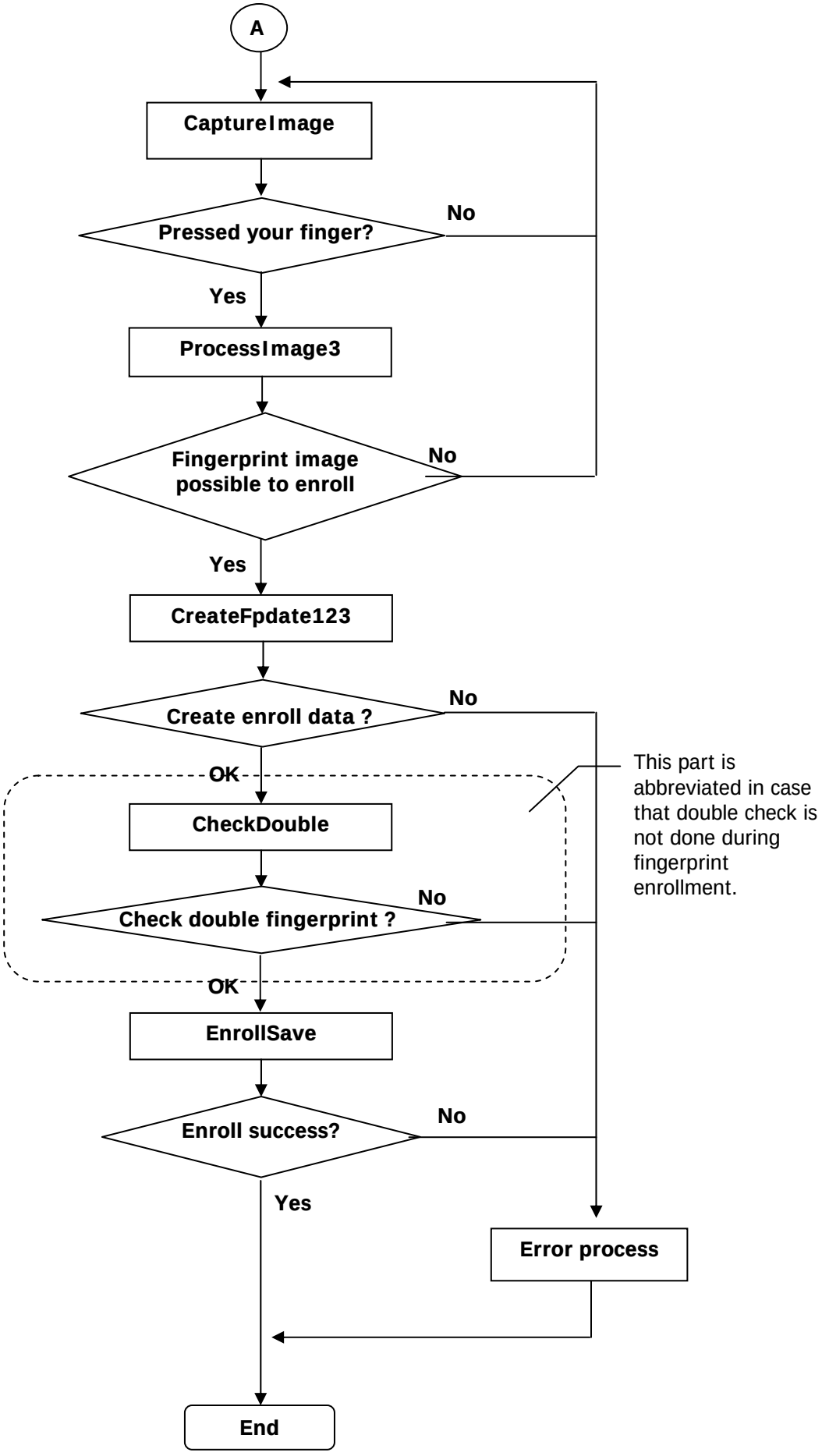
5.4.2. Enroll Fingerprint (enroll one fingerprint)



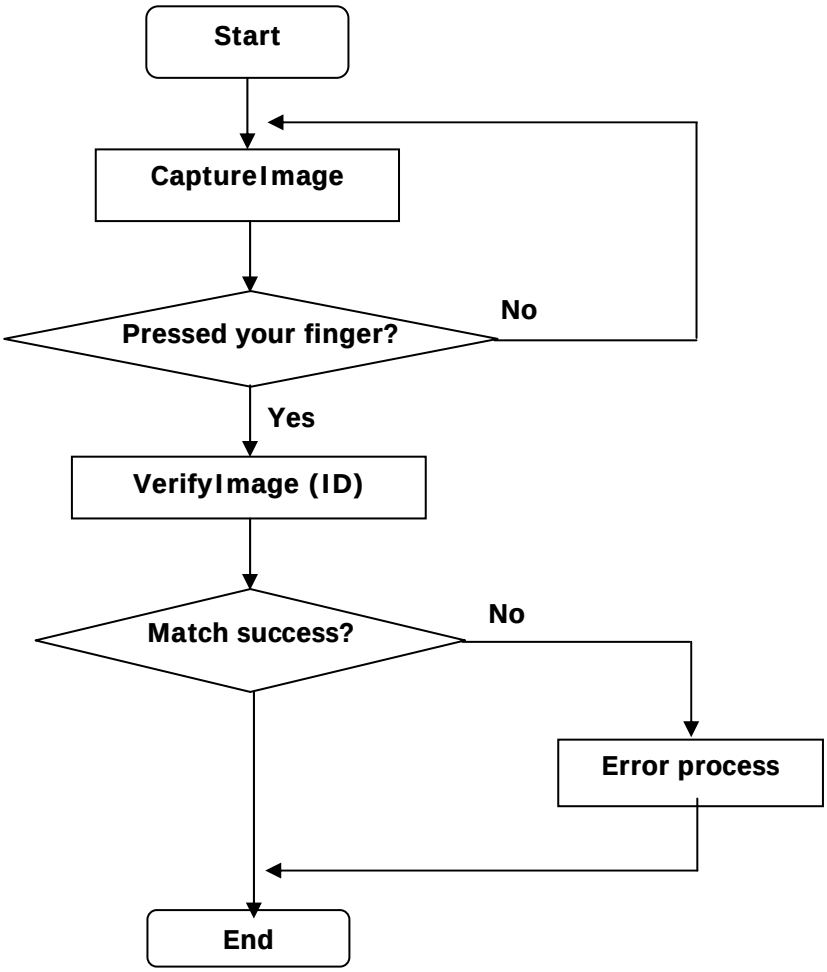
5.4.3. Fingerprint Enrollment (three fingerprints' enrolllment)



See the next page to be continued


A
CaptureImage
Pressed your finger?
No
Yes
ProcessImage3
Fingerprint image possible to enroll
No
Yes
CreateFpdate123
Create enroll data ?
No
OK
CheckDouble
Check double fingerprint ?
No
OK
EnrollSave
Enroll success?
No
Yes
Error process
End
This part is abbreviated in case that double check is not done during fingerprint enrollment.

5.4.4. Fingerprint Match (1 : 1)



5.4.5. Fingerprint Match (1 : N)